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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,316	09/16/2003	Chan Young Park	K-0541	1791
34610	7590	09/08/2004	EXAMINER	
FLESHNER & KIM, LLP P.O. BOX 221200 CHANTILLY, VA 20153			CHANG, AUDREY Y	
			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 09/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/662,316	Applicant(s) PARK, CHAN YOUNG	
	Examiner Audrey Y. Chang	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

1. **Claims 4, 7-8 and 14 are objected to because of the following informalities:**

(1). The phrase “the hologram pattern ... is formed in one pixel is different from the hologram pattern ... which is formed in its neighboring pixel” recited in claim 4 is confusing and indefinite since it is not clear what is considered to be the *difference in pattern*. It is not clear if this means the “**sub-pixels**” have hologram patterns for diffracting red, blue and green light respectively or not. Other than these different color holograms, the specification **fails** to disclose any other difference in patterns for the holograms in the neighboring **pixels**.

(2). The phrase “the liquid crystal comprises liquid crystal molecules having the hologram pattern and a monomer, and the liquid crystal molecules and the monomer are periodically arranged and have a shape of a band” recited in claim 7 is extremely confusing and wrong. Firstly, the liquid crystal molecules **do not** have a hologram pattern. Rather the liquid crystal molecules are oriented and dispersed in the monomer to form grating structure or hologram pattern. The *periodic arrangement* of the dispersed liquid crystal molecules in the monomer is the hologram pattern. Also a single band will not be able to form hologram pattern.

(3). The phrase “the display panel having the pixels formed thereon” recited in claim 14 is confusing and indefinite since it lacks proper antecedent basis from its based claim.

Appropriate correction is required.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the features concerning waveguide having plural cores for propagating the light as recited in claim 15 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Popovich et al (PN. 6,646,636) in view of the patent applicant publication of Popovich (US 2002/0126332) and patent issued to Kaneko et al (PN. 6,567,141).**

Popovich et al ('636) teaches a *display system* using a *hologram pattern formed in a liquid crystal material* (please see column 5) wherein the display system having a display device (28 or 128) with a plurality of *pixels* and a plurality of *holographic optical elements* (32, 34 in Figures 1-2, 5-9 or 94R-B, 96R-B in Figures 10-11), wherein each of *holographic elements* has *hologram pattern* formed in a

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liquid crystal material that is interposed between a pair of *electrodes* (40, Figures 3 and 4) and in the *pixel area* with respect to the display device. Each of the holographic elements is driven by a *controller* (36 or 100) such that a *controlled voltage* is applied across the electrodes so that the holographic element is set to be either in an *active* mode for diffracting incident light or in an *inactive* mode with no diffraction property. Popovich et al teaches that the holographic elements are recorded to have hologram patterns that may functions as *color filters*, *diffusion plate* or *lenses*, which means that they are of very different hologram patterns. Popovich et al ('636) further teaches that the display system comprises a *white light source* (22) and a *light guide* (24), serves as the *waveguide*, such that the light source is located at a side area of the light guide for directing illumination light to illuminate the display system.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the hologram patterns are formed in each pixel. Popovich ('332) in the same field of endeavor teaches a light modulator (which known in art is an image display device), wherein the light modulator comprises *switchable holographic elements*, that are of hologram patterns formed in a liquid crystal material, interposed between a pair of electrodes and the modulator further comprises a plurality of *individual electrodes* (350) that defines a plurality of *pixels* such that subareas of the switchable holograms corresponding to the pixels can be individually addressed and controlled, (please see Figure 24B and paragraphs [0146] to [0148]). The sub-area holographic elements are considered to be the hologram patterns formed in the pixels. It would then have been obvious to one skilled in the art to apply the teachings of Popovich ('322) to modify the electrode pattern of the display system of Popovich et al ('636) to make the holographic elements with *pixilated hologram patterns* that can be addressed individually and pixel by pixel for the benefit of making the display system with greater control in image display quality. Although these references do not teach explicitly that the pair of electrodes and the pixilated electrodes (350) are formed by two electrodes with two sets of electrode lines that are perpendicular to each other. However such arrangement is very common in the liquid crystal display

system as demonstrated by the teachings of **Kaneko et al** wherein electrodes formed in two sets orthogonal arranged lines (3 and 4, Figure 2) are used to defined the pixels areas for the display. It would then have been obvious to apply the teachings of **Kaneko et al** to modify the arrangement of electrodes for Popovich et al ('632) and Popovich ('332) to use orthogonally arranged electrodes lines to form the pixilated electrodes (350) for the benefit of improving the display system with reduced cost in providing the electrodes, (since less area of electrodes is used).

With regard to claims 2-3, Popovich et al ('636) teach the electrodes (40) are transparent and the driving unit and control unit (36) are explicitly disclosed in the Figures.

With regard to claims 4-6, **Popovich et al** ('636) teach that a plurality of holographic elements with hologram patterns for diffracting different colors of light (94R-B and 96R-B) are recorded or the holographic elements with hologram patterns for performing functions of deflecting, dispersing or focusing light may be recorded. This means the hologram patterns may be different from each other. But this reference does not teach explicitly about having the hologram patterns being recorded in different neighboring pixels. **Popovich** ('332) teaches that the light modulator may have *pixilated hologram patterns* for diffracting red, green and blue color of light wherein the hologram patterns are arranged in a *single hologram layer* such that different patterns (362r, 362g, 362b, Figure 27) are arranged in a neighboring pixel or sub-pixel areas, (please see paragraphs [0157] to [0160]). It would then have been obvious to one skilled in the art to apply the teachings of Popovich ('332) to modify the holographic elements of Popovich et al ('636) accordingly to provide an alternative arrangement of the color holographic elements to provide full color display.

With regard to claims 7-8, both Popovich et al ('636) and Popovich ('332) teach that the holographic elements are formed by holographically recording holographic fringe pattern in a mixed polymerizable monomer and liquid crystal material. A Bragg grating corresponding to the fringe pattern are formed within the mixed material and as demonstrated by Popovich ('323) the grating might have

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periodic bands of polymer dispersed liquid crystal plane and polymer plane, (please see Figures 1 and 8a).

Holographic recording means interference between lights is used to record the hologram pattern.

With regard to claims 9-12, Popovich et al ('636) teaches that the light source (22) may be of *polychromatic light source* or *white light source*, (please see columns 3-4). Although this reference does not teach explicitly to use the particular light sources claimed however high voltage mercury lamp and metal halide lamp are *conventionally* known white light sources. To use any of these lamps would be considered to be obvious modification and design choice to one skilled in the art for providing the desired light source. Popovich et al also teach that LED light source may be used. In order to provide polychromatic light, either a white LED or a plurality of LEDs each with specific desired color of light needed to be used. This suggests a plurality of light sources may be used to provide the polychromatic illumination light. Popovich et al ('636" shows, with regard to claim 12, that the light guide (24) may be placed at lower part of the first electrode, (please see Figure 1).

With regard to claim 13, Popovich et al ('636) teach that the light source is placed at one side face of the light guide but does not teach explicitly to use a reflector at the other side of the side face. However such modification must be obvious to one skilled in the art for the benefit of retroreflecting the illumination light back to the display system to enhance the lighting quality of the display system.

With regard to claims 14-15, Popovich et al ('636) teaches that the light guide has a core that is of the same area as of the display device (28, please see Figure 1). Although this reference does not teach explicitly that the light guide has a plural cores however such modification would have been obvious to one skilled in the art to allow the illumination light being guided to different desired locations of the display system.

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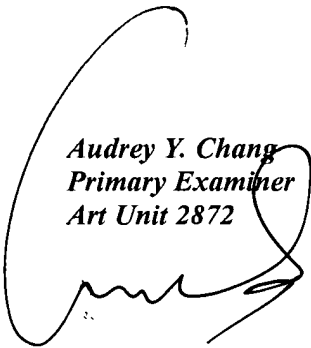
Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Audrey Y. Chang
Primary Examiner
Art Unit 2872*



A. Chang, Ph.D.